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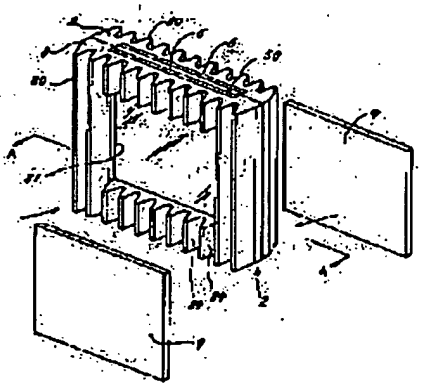
(54) LIQUID CRYSTAL PANEL AND PROJECTOR USING THE SAME

(57)Abstract:

PROBLEM TO BE SOLVED: To enhance cooling effects of substrates of a liquid crystal panel and polarizing plates.

SOLUTION: A liquid crystal panel 7 is constituted by sealing liquid crystal in between two sheets of transparent substrates 5, 5 and by arranging polarizing plates 9, 9 at outsides of respective substrates 5, 5. The both substrates 5, 5 are held by holding cases 8, 8 and openings 81 permitting the transmission of lights to the substrates 5, 5 are openedly provided in the holding cases 8, 8. Moreover, fins 80 for heat radiation are integrally provided at the outsides of the cases 8, 8 and the polarizing plates 9, 9 are provided outside or inside the fins 80 for heat radiation.



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CLAIMS

[Claim(s)]
[Claim 1] In the liquid crystal panel constituted by enclosing liquid crystal (51) between two transparent substrates (5) and (5), and arranging a polarizing plate (9) and (9) on the outside of each substrate (5) both substrates (5) and (5) It is pinched by the maintenance case (8) and (8). To each maintenance case (8) and (8) It is the liquid crystal panel characterized by having established opening (81) which allows transparency of the light of a substrate (5) and (5), having prepared the fin for heat dissipation (80) in the outside of a maintenance case (8) at one, and preparing a polarizing plate (9) an outside or inside the fin for heat dissipation (80).
[Claim 2] The liquid crystal panel according to claim 1 with which the glass plate (55) constituted also in glass material with the sapphire glass which has big thermal conductivity is attached in either [at least] the fin for heat dissipation (80), or a substrate (5).
[Claim 3] the spectrum which carries out the spectrum of the light from the light source (2) and the light source (2) to R, G, and B into a chassis (3) — with a means The liquid crystal panel corresponding to each light of R, G, and B (7) (7a) (7b), A synthetic means to compound the light which irradiated this liquid crystal panel (7) (7a) (7b), Have the projection lens (67) which copies the compounded light, and a liquid crystal panel (7) (7a) (7b) encloses liquid crystal (51) between two transparent substrates (5) and (5). In the projection arrangement constituted by arranging a polarizing plate (9) and (9) on the outside of each substrate (5) both the substrates (5) of each liquid crystal panel (7) (7a) (7b) and (5) The periphery section is pinched by the maintenance case (8) and (8). To each maintenance case (8) and (8) It is the projection arrangement characterized by having established opening (81) which allows transparency of the light of a substrate (5) and (5), having prepared the fin for heat dissipation (80) in the outside of a maintenance case (8) at one, and preparing a polarizing plate (9) an outside or inside the fin for heat dissipation (80).
[Claim 4] For the air from the fan (33) who put two or more projections (84) and (84) in a row to the horizontal single tier, was constituted, and was stationed by the chassis (3) bottom, the fin for heat dissipation (80) is a projection arrangement according to claim 3 which goes up and flows between a projection (84) and (84).

[Translation done.]

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1.This document has been translated by computer. So the translation may not reflect the original precisely.

2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to the projection arrangement which irradiates a liquid crystal panel and this panel with a powerful light, and irradiates an image at a screen.
[0002]
[Description of the Prior Art] The projection arrangement which irradiates a liquid crystal panel (7) with a powerful light from the former, and irradiates an image at a screen is known, and drawing 8 is the side elevation showing the fundamental configuration of a **** projection arrangement. The light from the light source (2) irradiates a liquid crystal panel (7), after being condensed by the 1st and 2nd integrator lens object (41), (42), and a condensing lens (43) and (44). Although drawing 9 is the sectional view which looked at the liquid crystal panel (7) from the side face, the liquid crystal panel (7) enclosed liquid crystal (51) between two transparent substrates (5) estranged slightly and (5), and has closed the periphery section between both substrates (5) and (5) with encapsulant (50). The polarizing plate (9) and (9) which allow passage of only one polarization among indeterminate polarization are prepared in the outside of each substrate (5) and (5). Since the light from the light source (2) is powerful, it is easy to overheat, consequently an image function deteriorates, and a substrate (5), (5), and a polarizing plate (9) have a possibility that endurance may fall. Therefore, air cooling of a substrate (5), (5), and the polarizing plate (9) is usually carried out from a lower part or the side.
[0003]
[Problem(s) to be Solved by the Invention] High brightness-ization with the much more **** equipment is called for, and the light irradiated from the light source (2) is also powerful in recent years. Therefore, much more becoming easy to carry out heat damage of a substrate (5), (5), and the polarizing plate (9), and raising the cooling effect is called for. In order to raise the air-cooling effectiveness generally, it is possible to attach the member for heat dissipation. The applicant hit on an idea of the cooling effect being high, when covering parts other than the part by which a substrate (5) and (5) are irradiated by the member for heat dissipation. This invention aims at heightening the cooling effect of the substrate (5) of a liquid crystal panel (7), (5), or a polarizing plate (9).
[0004]
[Means for Solving the Problem] A liquid crystal panel (7) encloses liquid crystal (51) between two transparent substrates (5) and (5), arranges a polarizing plate (9) and (9) on the outside of each substrate (5), and is constituted. Both substrates (5) and (5) are pinched by the maintenance case (8) and (8), and opening (81) which allows transparency of the light of a substrate (5) and (5) is established by each maintenance case (8) and (8). The fin for heat dissipation (80) is prepared in one, and the polarizing plate (9) is prepared in the outside of a maintenance case (8) an outside or inside the fin for heat dissipation (80).
[0005]
[Function and Effect] A substrate (5) and (5) are pinched by the maintenance case (8) which formed the fin for heat dissipation (80) in one, and (8). The polarizing plate (9) is prepared an outside or inside the fin for heat dissipation (80). Therefore, with a strong light from the light source (2), even if it irradiates the substrate (5) of a liquid crystal panel (7), (5), and a polarizing plate (9), overheating of the substrate (5) of a liquid crystal panel (7), (5), or a polarizing plate (9) is prevented, and can prevent heat damage. If opening (81) of a maintenance case (8) is especially made small as much as possible corresponding to the minimum exposure area of a substrate (5), the air-cooling effectiveness of the fin for heat dissipation (80) will become still better.

[0006]
[Embodiment of the Invention] Hereafter, an example of this invention is explained in full detail using drawing. The same sign is used about the same configuration as the former. Drawing 5 is the top view of a projection arrangement, and after this projection arrangement irradiates the liquid crystal panel of three sheets corresponding to R, G, and B which are the three primary colors of light with a strong light, it compounds light and projects an image on a screen. In a cabinet (6), the chassis (3) holding the liquid crystal panel (7) (7a) (7b) of three sheets is prepared, and the projection lens (67) is prepared in the front end section of this chassis (3). In a chassis (3), a prism object (30) is arranged by the optical axis and the same axle of a projection lens (67), this prism object (30) is inserted and the liquid crystal panel (7a) (7b) corresponding to R and B is arranged. A prism object (30) equips the interior with a reflecting layer (31), and the liquid crystal panel (7) corresponding to G is prepared in the opposite side of a projection lens (67) on both sides of this prism object (30). The light source (2) is arranged, and on an optical path, a total reflection mirror (75), (76), (77), (78), and a dichroic mirror (45) and (46) incline at an optical path, and it is arranged at the inlet port of a chassis (3). In the following publications, light carries out outgoing radiation from the light source (2), and let the direction which faces to a prism object (30) be the front.
[0007] The light from the light source (2) is reflected by the total reflection mirror (75) after being condensed with the 1st and 2nd integrator lens object (41), (42), and a condensing lens (43). A dichroic mirror (45) allows passage of R and reflects G and B. It is reflected by the total reflection mirror (76) and R irradiates the liquid crystal panel (7a) corresponding to R. It is reflected by the dichroic mirror (46) and incidence of the G is carried out to a prism object (30). After being reflected by a total reflection mirror (77) and (78), it is reflected in the reflecting layer (31) within a prism object (30), and incidence of the B is carried out to a projection lens (67). 3 colored light of R, G, and B is compounded with a prism object (30), and it is projected on a screen (68).
[0008] (The 1st example) Drawing 1 is the decomposition perspective view of a liquid crystal panel (7), and drawing 2 is the sectional view which fractured the same as the above by the A–A line. A liquid crystal panel (7) is equipped with the maintenance case (8) which poked mutually and was put together, and (8), and is pinching two transparent substrates (5) which countered mutually by this maintenance case (8) and (8), and (5). Liquid crystal (51) was enclosed with the clearance between both substrates (5) and (5), and encapsulant (50) has closed the periphery section between both substrates (5) and (5). The outside of a maintenance case (8) forms the fin for heat dissipation (80) which put two or more projections (84) and (84) in a row to the horizontal single tier, and a maintenance case (8) and the fin for heat dissipation (80) are formed in one of processing of aluminum die casting or a copper plate. As a material of a maintenance case (8) and the fin for heat dissipation (80), the thermal conductivity of aluminum depends on it being 403 (1–/W–m –1–K–1), the thermal conductivity of 236 (1–/W–m –1–K–1) and copper having large thermal conductivity as compared with other metals, such as iron, and its heat dissipation effectiveness being it high to use aluminum or copper.
[0009] Opening (81) of the center section of the fin for heat dissipation (80) and (80) is carried out, and incidence of the light from the outside is carried out to two substrates (5) and (5) through this opening (81). As usual, it has a polarizing plate (9) and (9), this polarizing plate (9) and (9) are attached at the tip of the fin for heat dissipation (80), and a liquid crystal panel (7) is a wrap about opening (81). Like common knowledge, as for a polarizing plate (9) and (9), the polarization direction lies at right angles mutually, if the electric supply and cutoff to the liquid crystal (51) enclosed between a substrate (5) and (5) are switched, cutoff and passage of light will switch and an image will be displayed.
[0010] Since it irradiates with a powerful light, it is easy to overheat the light source (2). the appropriate maintenance case (8) which has a fin for heat dissipation (80) in a substrate (5), (5), and a polarizing plate (9) if it is alike and is in this example is attached, and the cooling effect is heightened. Therefore, with a strong light from the light source (2), even if it irradiates the substrate (5) of a liquid crystal panel (7), (5), and a polarizing plate (9), overheating of a substrate (5), (5), and a polarizing plate (9) is

prevented, and can prevent heat damage. If opening (81) is especially made small as much as possible corresponding to the minimum exposure area of a substrate (5), the air-cooling effectiveness of the fin for heat dissipation (80) will become still better. In addition, the transparence electric conduction film (not shown) may be formed on a substrate (5), and thermal conductivity may be raised further. Moreover, a polarizing plate (9) and (9) may be prepared in contact with a substrate (5) in the inside of a maintenance case (8) instead of preparing in the outside of a maintenance case (8) at drawing 2 , as an alternate long and short dash line shows. Furthermore, a flat spring (82) may be prepared in the inside of one maintenance case (8), and a substrate (5) and (5) may be pressed in the maintenance case (8) of another side.

[0011] Drawing 6 is drawing of longitudinal section showing the anchoring condition to the chassis (3) of a liquid crystal panel (7). On the chassis (3), under the liquid crystal panel (7), opening (32) is formed and the fan (33) is prepared in this opening (32) bottom. Although air cooling of the liquid crystal panel (7) is done by the fan (33), the fin for heat dissipation (80) is raising the cooling effect. In here, as shown in drawing 5 , on the chassis (3), the liquid crystal panel (7) (7a) (7b) of three sheets is prepared, and opening (32) is established corresponding to each liquid crystal panel (7) (7a) (7b). Although a fan (33) passes along opening (32), (32), and (32) and the liquid crystal panel (7) (7a) (7b) of three sheets is cooled, the cooling air from a fan (33) goes up through between the projections (84) of the fin for heat dissipation (80). Thereby, the liquid crystal panel of the liquid crystal panel (7) (7a) (7b) of three sheets can be cooled by one fan (33). That is, if the fitting location differs from the adjacent liquid crystal panel by a unit of 90 degrees and each liquid crystal panel (7) (7a) (7b) installs a fan (33) in the side side of each liquid crystal panel (7) (7a) (7b) as shown in drawing 5 , it is difficult to cool the liquid crystal panel (7) (7a) (7b) of three sheets at once. Therefore, the fan (33) was installed in the liquid crystal panel (7) (7a) (7b) bottom.

[0012] (The 2nd example) Drawing 3 is the flat-surface sectional view of the liquid crystal panel (7) in other examples. This attaches the transparent glass plate for protection against dust (55), and (55) in a substrate (5) and (5), and pinches this by the maintenance case (8) and (8). By forming this glass plate (55) and (55) with sapphire glass with big thermal conductivity etc., through a glass plate (55) and (55), it is [the heat of a substrate (5)] propagation-easy on the fin for heat dissipation (80), it is used as it, and the cooling effect is heightened. Here, although there is heat conductivity of sapphire glass with a rose by the component ratio of glass, the cooling effect is large [heat conductivity / it is a bigger value than 0.55-0.75 (1/W-m -1-K-1) which is the heat conductivity of common soda glass, and] rather than it forms a glass plate (55) and (55) with soda glass. In addition, a substrate (5) may consist of sapphire glass. Moreover, the transparence electric conduction film (not shown) may be formed on a glass plate (55), and thermal conductivity may be raised further. Furthermore, the transparence electric conduction film may be formed on a substrate (5) like the above, and a polarizing plate (9) and (9) may be prepared in contact with a substrate (5) in the inside of a maintenance case (8) instead of preparing in the outside of a maintenance case (8).

[0013] (The 3rd example) Drawing 4 is the flat-surface sectional view of the liquid crystal panel (7) in other examples. If it is in this example, the periphery section of two substrates (5) and (5) was held at the frame made from plastics (52) (refer to drawing 7), and transparent and formed with ingredient with big thermal conductivity pars intermedia material (95) like sapphire glass is in contact with the outside of each substrate (5) and (5). A center section carries out opening (81) to the outside of this pars intermedia material (95), the fin for the 1st heat dissipation (80) constituted by putting a crest-like projection (84) in a row in a longitudinal direction is attached in it, and the fin for the 1st heat dissipation (80), and isomorphism-like the fin for the 2nd heat dissipation (83) are attached in the outside of this fin for the 1st heat dissipation (80). The fin for the 1st heat dissipation (80) and the fin for the 2nd heat dissipation (83) compare the top-most vertices of a mutual projection (84), and a closed space (85) is formed between adjacent projections (84). Cooling air flows this closed space (85) up and down. Thus, the fin for the 1st heat dissipation (80) and the fin for the 2nd heat dissipation (83) are prepared, area of

air and the part which touches is enlarged, and the cooling effect is heightened. A glass plate (86) is formed in the outside of the fin for the 2nd heat dissipation (83), and the polarizing plate (9) located in opening (81) of the fin for the 2nd heat dissipation (83) is attached in it at the inside of this glass plate (86). In addition, a direct polarizing plate (9) may be attached in the outside of the fin for the 2nd heat dissipation (83).

[0014] Explanation of the above-mentioned example is for explaining this invention, and it should not be understood so that invention of a publication may be limited to a claim or the range may be ****(ed). Moreover, as for each part configuration of this invention, it is needless to say for deformation various by technical within the limits given not only in the above-mentioned example but a claim to be possible.

[Translation done.]

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is the decomposition perspective view of a liquid crystal panel.

[Drawing 2] It is a flat-surface sectional view same as the above.

[Drawing 3] It is the flat-surface sectional view of the liquid crystal panel in other examples.

[Drawing 4] It is the flat-surface sectional view of the liquid crystal panel in other examples.

[Drawing 5] It is the top view of a projection arrangement.

[Drawing 6] It is drawing of longitudinal section showing the liquid crystal panel on a chassis, and a fan's physical relationship.

[Drawing 7] It is the perspective view of the substrate supported by the frame.

[Drawing 8] It is the side elevation showing the fundamental configuration of a projection arrangement.

[Drawing 9] It is the side-face sectional view of a liquid crystal panel.

[Description of Notations]

(2) Light source
(3) Chassis
(5) Substrate
(7) Liquid crystal panel
(9) Polarizing plate
(51) Liquid crystal
(55) Glass plate
(80) The fin for heat dissipation

[Translation done.]

5

2枚の基板(5)(5)の周縁部は、プラスチック製の枠体(52)に保持され(図7参照)、各基板(5)(5)の外側に、サファイアガラスのような透明で熱伝導率の大きな材料で形成された中間部材(95)が当接している。該中間部材(95)の外側には、中央部が開口(81)し、山状の突起(84)を横方向に連ねて構成された第1放熱用フィン(80)が取り付けられ、該第1放熱用フィン(80)の外側に、第1放熱用フィン(80)と同形状の第2放熱用フィン(83)が取り付けられる。第1放熱用フィン(80)と第2放熱用フィン(83)は、互いの突起(84)の頂点を突き合わせ、隣り合う突起(84)との間に閉空間(85)が形成される。冷却空気は、該閉空間(85)を上下に流れる。このように、第1放熱用フィン(80)と第2放熱用フィン(83)を設けて、空気と触れる部分の面積を大きくし、冷却効果を高めている。第2放熱用フィン(83)の外側には、ガラス板(86)が設けられ、該ガラス板(86)の内面には、第2放熱用フィン(83)の開口(81)内に位置する偏光板(9)が取り付けられている。尚、第2放熱用フィン(83)の外側に直接偏光板(9)を取り付けても良い。

【0014】上記実施例の説明は、本発明を説明するためのものであって、特許請求の範囲に記載の発明を限定し、或は範囲を減縮する様に解すべきではない。又、本発明の各部構成は上記実施例に限らず、特許請求の範囲に記載の技術的範囲内で種々の変形が可能であることは勿論である。

6

【図面の簡単な説明】

【図1】液晶パネルの分解斜視図である。

【図2】同上の平面断面図である。

【図3】他の実施例に於ける液晶パネルの平面断面図である。

【図4】他の実施例に於ける液晶パネルの平面断面図である。

【図5】投写装置の平面図である。

【図6】シャーシ上の液晶パネルとファンの位置関係を示す縦断面図である。

【図7】枠体に支持された基板の斜視図である。

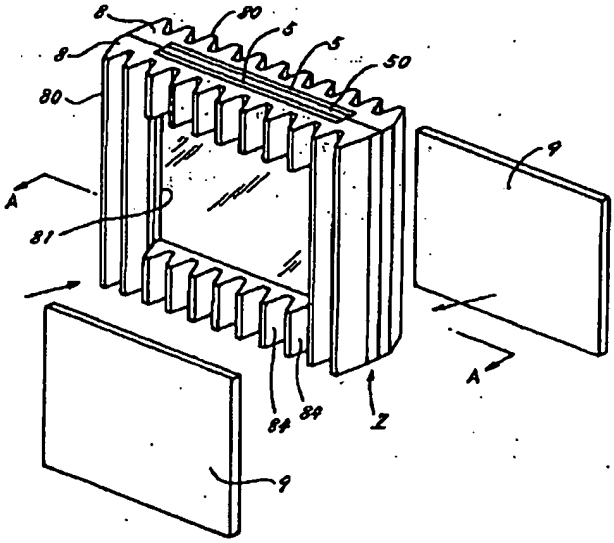
【図8】投写装置の基本的構成を示す側面図である。

【図9】液晶パネルの側面断面図である

【符号の説明】

(2) 光源
(3) シャーシ
(5) 基板
(7) 液晶パネル
(9) 偏光板
(51) 液晶
(55) ガラス板
(80) 放熱用フィン

【図1】



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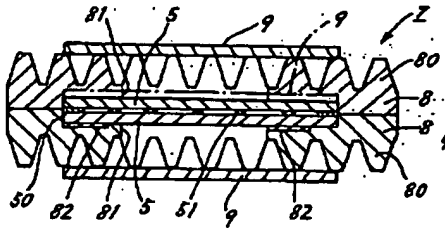

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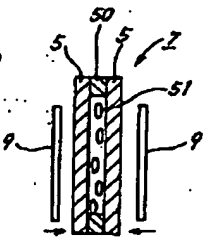

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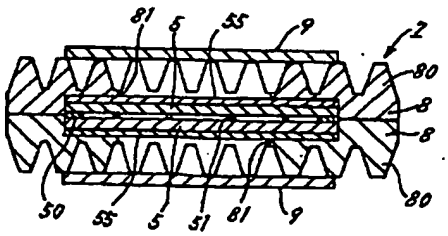

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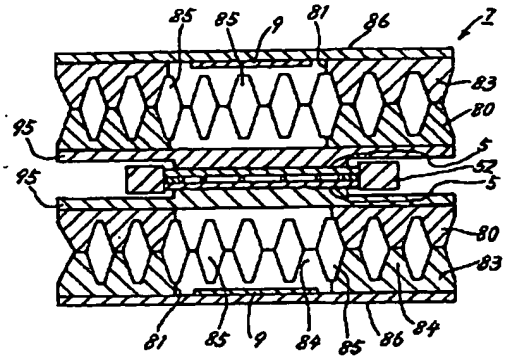

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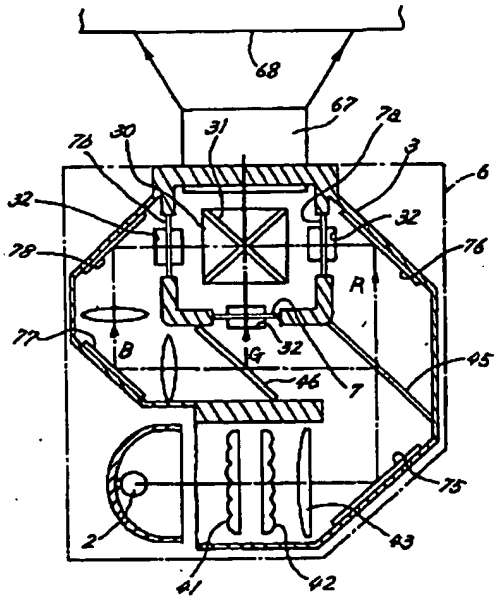

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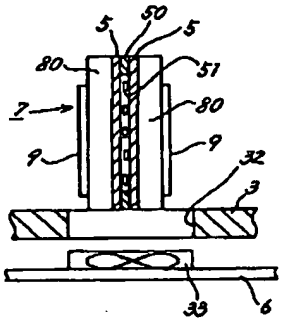

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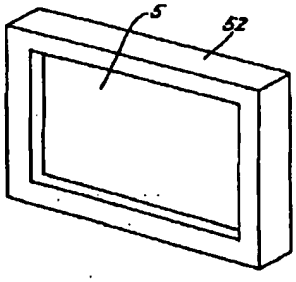
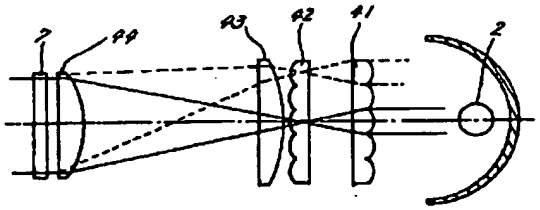


【図８】



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